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<110>   IZUI, MASAKO
        SUGIMOTO, MASAKAZU
        KURAHASHI, OSAMU
        NAKAMATSU, TSUYOSHI

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<140>   US 10/019,284
<141>   2002-01-02

<150>   JP 11-189512
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cat gga cca taa gga cct cgc gca acg cat cct gcg cga cat tgg cgg    3826
His Gly Pro     Gly Pro Arg Ala Thr His Pro Ala Arg His Trp Arg
1                5                  10               15

cga aga caa cat tgt cgc cgc cgc aca ctg tgc aac gcg ttt acg cct    3874
Arg Arg Gln His Cys Arg Arg Arg Thr Leu Cys Asn Ala Phe Thr Pro
              20                  25               30

cgt gct caa aga cac caa gga tgt gga tcg cca aag tct gga tga tga    3922
Arg Ala Gln Arg His Gln Gly Cys Gly Ser Pro Lys Ser Gly
          35                  40               45
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3

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tcc aga tct gaa agg cac ctt tga aac tgg cgg cat gtt cca gat cat        3970
Ser Arg Ser Glu Arg His Leu     Asn Trp Arg His Val Pro Asp His
            50                          55                  60

cgt cgg gcc agg cga tgt gga tca tgt ttt caa aga act cga tga cgc        4018
Arg Arg Ala Arg Arg Cys Gly Ser Cys Phe Gln Arg Thr Arg     Arg
                65              70                          75

aac ctc caa aga cat cgc tgt gtc cac aga gca gct caa aga tgt tgt        4066
Asn Leu Gln Arg His Arg Cys Val His Arg Ala Ala Gln Arg Cys Cys
            80              85                          90

ggc taa caa cgc caa ctg gtt cag ccg tgc tgt gaa ggt att ggc gga        4114
Gly     Gln Arg Gln Leu Val Gln Pro Cys Cys Glu Gly Ile Gly Gly
                95              100                     105

cat ttt cgt ccc gct gat tcc aat ctt ggt tgg tgg cgg tct gct cat        4162
His Phe Arg Pro Ala Asp Ser Asn Leu Gly Trp Trp Arg Ser Ala His
            110                 115                     120

ggc tat caa caa tgt gtt ggt tgc gca gga tct gtt cgg tcc gca atc        4210
Gly Tyr Gln Gln Cys Val Gly Cys Ala Gly Ser Val Arg Ser Ala Ile
            125                 130             135

act ggt gga gat gtt ccc tca gat cag cgg tgt tgc tga gat gat caa        4258
Thr Gly Gly Asp Val Pro Ser Asp Gln Arg Cys Cys     Asp Asp Gln
        140                 145             150

cct gat ggc atc tgc gcc gtt cgc gtt ctt gcc agt gtt ggt tgg ttt        4306
Pro Asp Gly Ile Cys Ala Val Arg Val Leu Ala Ser Val Gly Trp Phe
        155                 160             165

cac cgc aac caa gcg ttt cgg tgg caa tga gtt cct ggg cgc cgg cat        4354
His Arg Asn Gln Ala Phe Arg Trp Gln     Val Pro Gly Arg Arg His
170                 175                     180

tgg tat ggc gat ggt gtt ccc aac cct ggt taa cgg cta cga cgt ggc        4402
Trp Tyr Gly Asp Gly Val Pro Asn Pro Gly     Arg Leu Arg Arg Gly
185                 190                     195

cgc cac cat gac cgc ggg cga aat gcc aat gtg gtc cct gtt tgg ttt        4450
Arg His His Asp Arg Gly Arg Asn Ala Asn Val Val Pro Val Trp Phe
200                 205                 210                 215

gga tgt tgc tca agc tgg tta cca ggg cac cgt gct tcc tgt gct ggt        4498
Gly Cys Cys Ser Ser Trp Leu Pro Gly His Arg Ala Ser Cys Ala Gly
                220                 225                 230

ggt ctc ttg gat tct ggc aac gat cga gaa gtt cct gca caa gcg act        4546
Gly Leu Leu Asp Ser Gly Asn Asp Arg Glu Val Pro Ala Gln Ala Thr
            235                 240                 245

cat ggg cac tgc aga ctt cct gat cac ccc agt gtt gac tct gct gct        4594
His Gly His Cys Arg Leu Pro Asp His Pro Ser Val Asp Ser Ala Ala
        250                 255                 260

cac cgg ctt cct tac gtt cat tgc tat tgg tcc agc aat gcg ctg ggt        4642
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4

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His Arg Leu Pro Tyr Val His Cys Tyr Trp Ser Ser Asn Ala Leu Gly
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ggg tga ctt gct ggc aca cgg tct gca ggg act cta tga ttt cgg tgg    4690
Gly     Leu Ala Gly Thr Arg Ser Ala Gly Thr Leu     Phe Arg Trp
280                         285             290

tcc agt cgg cgg tct gct ttt cgg tct ggt cta ctc acc aat cgt tat    4738
Ser Ser Arg Arg Ser Ala Phe Arg Ser Gly Leu Leu Thr Asn Arg Tyr
    295             300                     305

cac tgg tct gca cca gtc ctt ccc gcc aat tga gct gga gct gtt caa    4786
His Trp Ser Ala Pro Val Leu Pro Ala Asn     Ala Gly Ala Val Gln
310                 315                     320

cca ggg tgg atc ctt cat chc gca acc gca tcc atg gcc aat atc gcg    4834
Pro Gly Trp Ile Leu His Xaa Ala Thr Ala Ser Met Ala Asn Ile Ala
325                 330                 335                 340

cag ggt gca gca tgt ttg gca gtg ttc ttc cta gcg aag agt gaa aag    4882
Gln Gly Ala Ala Cys Leu Ala Val Phe Phe Leu Ala Lys Ser Glu Lys
                345             350                     355

ctc aag ggc ctt gca ggt gct tca ggt gtc tcc gct gtt ctt ggt att    4930
Leu Lys Gly Leu Ala Gly Ala Ser Gly Val Ser Ala Val Leu Gly Ile
            360             365                 370

aca gag cct gcg atc ttc ggt gtg aac ctt cgc ctg cgc tgg ccg ttc    4978
Thr Glu Pro Ala Ile Phe Gly Val Asn Leu Arg Leu Arg Trp Pro Phe
            375             380                 385

tac att ggt atc ggt acc gca gct atc ggt ggc gct ttg att gca ctc    5026
Tyr Ile Gly Ile Gly Thr Ala Ala Ile Gly Gly Ala Leu Ile Ala Leu
        390             395                 400

ttt gat atc aag gca gtt gcg ttg ggc gct gca ggt ttc ttg ggt gtt    5074
Phe Asp Ile Lys Ala Val Ala Leu Gly Ala Ala Gly Phe Leu Gly Val
405                 410                 415                 420

gtt tct att gat gct cca gat atg gtc atg ttc ttg gtt tgc gcg gta    5122
Val Ser Ile Asp Ala Pro Asp Met Val Met Phe Leu Val Cys Ala Val
                425                 430                 435

gtt acc ttt gtc atc gca ttc ggc gca gcg att gct tat ggc ctt tac    5170
Val Thr Phe Val Ile Ala Phe Gly Ala Ala Ile Ala Tyr Gly Leu Tyr
            440                 445                 450

ttg gtt cgc cgc aac ggc agc att gat cca gat gca acc gct gct cca    5218
Leu Val Arg Arg Asn Gly Ser Ile Asp Pro Asp Ala Thr Ala Ala Pro
            455                 460                 465

gtg cct gca gga acg acc aaa gcc gaa gca gaa gca ccc gca gaa ttt    5266
Val Pro Ala Gly Thr Thr Lys Ala Glu Ala Glu Ala Pro Ala Glu Phe
470                 475                 480

tca aac gat tcc acc atc atc cag gca cct ttg acc ggt gaa gct atc    5314
Ser Asn Asp Ser Thr Ile Ile Gln Ala Pro Leu Thr Gly Glu Ala Ile
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5

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Ala Leu Ser Ser Val Ser Asp Ala Met Phe Ala Ser Gly Lys Leu Gly
                505                     510                 515

                                                                          5410
tca ggt gtt gcg atc gtc ccc acc aag ggg cag ctg gtt tca cca gtg
Ser Gly Val Ala Ile Val Pro Thr Lys Gly Gln Leu Val Ser Pro Val
                520                     525             530

                                                                          5458
agc gga aag atc gtg gtg gcc ttc cca tct ggt cac gct ttc gca gtc
Ser Gly Lys Ile Val Val Ala Phe Pro Ser Gly His Ala Phe Ala Val
            535                 540                 545

                                                                          5506
cgc act aag gct gag gat ggt tcc aat gtg gat atc ttg atg cac att
Arg Thr Lys Ala Glu Asp Gly Ser Asn Val Asp Ile Leu Met His Ile
        550                 555                 560

                                                                          5554
ggt ttc gac acc gta aac ctc aac ggc acg cac ttt aac ccg ctg aag
Gly Phe Asp Thr Val Asn Leu Asn Gly Thr His Phe Asn Pro Leu Lys
565                 570                 575                 580

                                                                          5602
aag cag ggc gat gaa gtc aaa gca ggg gag ctg ctg tgt gaa ttc gat
Lys Gln Gly Asp Glu Val Lys Ala Gly Glu Leu Leu Cys Glu Phe Asp
                585                 590                 595

                                                                          5650
att gat gcc att aag gct gca ggt tat gag gta acc acg ccg att gtt
Ile Asp Ala Ile Lys Ala Ala Gly Tyr Glu Val Thr Thr Pro Ile Val
                600                 605             610

                                                                          5698
gtt tcg aat tac aag aaa acc gga cct gta aac act tac ggt ttg ggc
Val Ser Asn Tyr Lys Lys Thr Gly Pro Val Asn Thr Tyr Gly Leu Gly
            615                 620                 625

                                                                          5746
gaa att gaa gcg gga gcc aac ctg ctc aac gtc gca aag aaa gaa gcg
Glu Ile Glu Ala Gly Ala Asn Leu Leu Asn Val Ala Lys Lys Glu Ala
        630                 635                 640

                                                                          5801
gtg cca gca aca cca taagttgaaa ccttgagtgt tcgcacacag gttagactag
Val Pro Ala Thr Pro
645

                                                                          5861
gggacgtgac tctacgcatc tttgacaccg gtacccgtac gcttcgagat tttaaacctg

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ttcaaccagg tcatgcctcg gtgtacctgt gtggtgccac cccgcaatct tcaccccaca

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Cys Arg Arg Arg Thr Leu Cys Asn Ala Phe Thr Pro Arg Ala Gln Arg
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His Gln Gly Cys Gly Ser Pro Lys Ser Gly
            35                  40


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Ser Arg Ser Glu Arg His Leu
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<400>  4

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1               5                   10                  15


Cys Phe Gln Arg Thr Arg
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<210>  5
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<400>  5

Arg Asn Leu Gln Arg His Arg Cys Val His Arg Ala Ala Gln Arg Cys
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Cys Gly


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Gln Gln Cys Val Gly Cys Ala Gly Ser Val Arg Ser Ala Ile Thr Gly
            35   40   45

Gly Asp Val Pro Ser Asp Gln Arg Cys Cys
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Gly Trp Phe His Arg Asn Gln Ala Phe Arg Trp Gln
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<400>   8

Val Pro Gly Arg Arg His Trp Tyr Gly Asp Gly Val Pro Asn Pro Gly
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Arg Leu Arg Arg Gly Arg His His Asp Arg Gly Arg Asn Ala Asn Val
1   5   10   15

Val Pro Val Trp Phe Gly Cys Cys Ser Ser Trp Leu Pro Gly His Arg
            20   25   30

8

Ala Ser Cys Ala Gly Gly Leu Leu Asp Ser Gly Asn Asp Arg Glu Val
        35   40   45

Pro Ala Gln Ala Thr His Gly His Cys Arg Leu Pro Asp His Pro Ser
        50   55   60

Val Asp Ser Ala Ala His Arg Leu Pro Tyr Val His Cys Tyr Trp Ser
65   70   75   80

Ser Asn Ala Leu Gly Gly
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<213>   Brevibacterium lactofermentum

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<213>   Brevibacterium lactofermentum

<400>   11

Phe Arg Trp Ser Ser Arg Arg Ser Ala Phe Arg Ser Gly Leu Leu Thr
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Asn Arg Tyr His Trp Ser Ala Pro Val Leu Pro Ala Asn
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<210>   12
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Met Ala Asn Ile Ala Gln Gly Ala Ala Cys Leu Ala Val Phe Phe Leu
                    20                  25                  30

Ala Lys Ser Glu Lys Leu Lys Gly Leu Ala Gly Ala Ser Gly Val Ser
            35                  40                  45

Ala Val Leu Gly Ile Thr Glu Pro Ala Ile Phe Gly Val Asn Leu Arg
        50                  55                  60

Leu Arg Trp Pro Phe Tyr Ile Gly Ile Gly Thr Ala Ala Ile Gly Gly
65                  70                  75                      80

Ala Leu Ile Ala Leu Phe Asp Ile Lys Ala Val Ala Leu Gly Ala Ala
                85                  90                  95

Gly Phe Leu Gly Val Val Ser Ile Asp Ala Pro Asp Met Val Met Phe
            100                 105                 110

Leu Val Cys Ala Val Val Thr Phe Val Ile Ala Phe Gly Ala Ala Ile
            115                 120                 125

Ala Tyr Gly Leu Tyr Leu Val Arg Arg Asn Gly Ser Ile Asp Pro Asp
        130                 135                 140

Ala Thr Ala Ala Pro Val Pro Ala Gly Thr Thr Lys Ala Glu Ala Glu
145                 150                 155                     160

Ala Pro Ala Glu Phe Ser Asn Asp Ser Thr Ile Ile Gln Ala Pro Leu
                165                 170                 175

Thr Gly Glu Ala Ile Ala Leu Ser Ser Val Ser Asp Ala Met Phe Ala
                180                 185                 190

Ser Gly Lys Leu Gly Ser Gly Val Ala Ile Val Pro Thr Lys Gly Gln
            195                 200                 205

Leu Val Ser Pro Val Ser Gly Lys Ile Val Val Ala Phe Pro Ser Gly
        210                 215                 220

His Ala Phe Ala Val Arg Thr Lys Ala Glu Asp Gly Ser Asn Val Asp
225                 230                 235                     240
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10

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Ile Leu Met His Ile Gly Phe Asp Thr Val Asn Leu Asn Gly Thr His
             245             250                 255

Phe Asn Pro Leu Lys Lys Gln Gly Asp Glu Val Lys Ala Gly Glu Leu
             260             265                 270

Leu Cys Glu Phe Asp Ile Asp Ala Ile Lys Ala Ala Gly Tyr Glu Val
             275             280                 285

Thr Thr Pro Ile Val Val Ser Asn Tyr Lys Lys Thr Gly Pro Val Asn
     290             295             300

Thr Tyr Gly Leu Gly Glu Ile Glu Ala Gly Ala Asn Leu Leu Asn Val
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Ala Lys Lys Glu Ala Val Pro Ala Thr Pro
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<210> 22
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